Complete Summary

GUIDELINE TITLE

Public Health Service Task Force recommendations for use of antiretroviral drugs in pregnant HIV-infected women for maternal health and interventions to reduce perinatal HIV transmission in the United States.

BIBLIOGRAPHIC SOURCE(S)

Perinatal HIV Guidelines Working Group. Public Health Service Task Force recommendations for use of antiretroviral drugs in pregnant HIV-1-infected women for maternal health and interventions to reduce perinatal HIV-1 transmission in the United States. Rockville (MD): U.S. Public Health Service; 2008 Jul 8. 98 p. [322 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Perinatal HIV Guidelines Working Group. Public Health Service Task Force recommendations for use of antiretroviral drugs in pregnant HIV-1-infected women for maternal health and interventions to reduce perinatal HIV-1 transmission in the United States. Rockville (MD): U.S. Public Health Service; 2007 Nov 2. 96 p. [315 references]

**** REGULATORY ALERT ****

FDA WARNING/REGULATORY ALERT

Note from the National Guideline Clearinghouse: This guideline references drugs for which important revised regulatory information has been released.

- July 31, 2008, Erythropoiesis Stimulating Agents (ESAs): Amgen and the U.S. Food and Drug Administration (FDA) informed healthcare professionals of modifications to certain sections of the Boxed Warnings, Indications and Usage, and Dosage and Administration sections of prescribing information for Erythropoiesis Stimulating Agents (ESAs). The changes clarify the FDA-approved conditions for use of ESAs in patients with cancer and revise directions for dosing to state the hemoglobin level at which treatment with an ESA should be initiated.
- July 24, 2008, Ziagen (abacavir sulfate): The U.S. Food and Drug Administration (FDA) has notified the maker of abacavir and abacavir-containing medications of the need to add information to the current BOXED WARNING about the recommendation to test all patients for the HLA-B*5701 allele before starting or restarting therapy with abacavir or abacavir-containing medications.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

- Human immunodeficiency virus (HIV) infection during pregnancy
- Acquired immunodeficiency syndrome (AIDS) during pregnancy
- Perinatally transmitted HIV infection

GUIDELINE CATEGORY

Management
Prevention
Treatment

CLINICAL SPECIALTY

Family Practice
Infectious Diseases
Internal Medicine
Obstetrics and Gynecology
Pediatrics
Preventive Medicine

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Health Care Providers
Health Plans
Nurses
Physician Assistants
Physicians
Public Health Departments

GUIDELINE OBJECTIVE(S)

- To update the November 2, 2007 guidelines developed by the Public Health Service for the use of antiretroviral drugs to reduce the risk for perinatal human immunodeficiency virus (HIV) transmission
- To provide health care providers with information for discussion with HIV-infected pregnant women to enable such women to make informed decisions regarding the use of antiretroviral drugs during pregnancy and use of elective cesarean delivery to reduce perinatal HIV transmission

TARGET POPULATION

Human immunodeficiency virus (HIV)-infected pregnant women and their infants in the United States

INTERVENTIONS AND PRACTICES CONSIDERED

Preconceptional Counseling and Care

1. Selection of effective and appropriate contraceptive methods
2. Counseling on safe sexual practices and elimination of alcohol, illicit drug use, and smoking
3. Consideration of effectiveness of treatment and potential teratogenicity of antiretroviral regimens
4. Attainment of stable viral load prior to conception
5. Management of uninfected woman with human immunodeficiency virus (HIV) infected partner, including HIV testing and interventions to reduce risk of transmission

Antepartum Care

1. Initial evaluation, including evaluation of HIV disease status and recommendations regarding antiretroviral treatment with discussion of risks and benefits of antiretroviral use
2. Recommendations for antiretroviral regimen including zidovudine
3. Antiretroviral drug resistance studies for those with detectable HIV ribonucleic acid (RNA) levels
4. Emphasis on importance of adherence
5. Coordination of services among prenatal, HIV, and primary care providers
6. Consideration of special situations, including hepatitis B and hepatitis C coinfection, stopping antiretroviral therapy during pregnancy, and failure of viral suppression
7. Monitoring of woman and fetus (CD4 count, plasma HIV RNA, antiretroviral drug resistance testing, monitoring for complications of therapy, ultrasound for gestational age, and assessment of fetal anatomy)
8. Measure to prevent antiretroviral drug resistance

Intrapartum Care

1. Antiretroviral therapy/prophylaxis, including ZDV and consideration of whether to continue other drug regimens
2. Scheduled cesarean delivery for women with suboptimal viral suppression or unknown HIV RNA levels

3. Rapid antibody HIV testing for women with unknown HIV status

Postpartum Care

1. Individualized decisions about whether to stop or continue antiretroviral therapy
2. Assurance of supportive services for mother
3. Confirmatory testing and follow-up for those with positive rapid HIV antibody test
4. Avoidance of breastfeeding
5. Contraceptive counseling
6. Review and optimization of mother's health care services

Neonatal Postnatal Care

1. Rapid antibody testing for infants born to mothers of unknown HIV status, with confirmatory testing for those with positive tests
2. 6-week ZDV chemoprophylaxis
3. Individualized decision on alternate or additional drugs
4. Complete blood count
5. Consideration of timing of hematologic monitoring
6. *Pneumocystis jirovecii* pneumonia prophylaxis
7. Long-term follow-up

See Table 3 "Antiretroviral Drug Use in Pregnant HIV-Infected Women: Pharmacokinetic and Toxicity Data in Human Pregnancy and Recommendations for Use in Pregnancy" and Table 4 "Clinical Scenario Summary Recommendations for Antiretroviral Drug Use in Pregnant HIV-Infected Women and Prevention of Perinatal HIV-1 Transmission in the United States" in the original guideline document for specific information about recommended and alternate agents, as well as drugs that are not recommended for use in pregnancy.

MAJOR OUTCOMES CONSIDERED

- Perinatal transmission of human immunodeficiency virus type 1 (HIV-1) from mother to newborn
- Adverse and teratogenic effects of drug treatment on the fetus
- Adverse effects of drug treatment on HIV-1-infected women
- Maternal viral load (HIV-1 ribonucleic acid [RNA] levels)
- Complications of cesarean delivery

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases
Searches of Unpublished Data

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Not stated

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Review
Review of Published Meta-Analyses

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not stated

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Note from the Centers for Disease Control and Prevention (CDC) and the National Guideline Clearinghouse (NGC): The current guidelines have been restructured to better reflect the management of an individual mother-child pair, and are organized into principles for management of the woman and her infant during the antepartum, intrapartum, and postpartum period. Key issues and new information discussed in this report include:

- **Lessons learned from clinical trials of antiretroviral drugs to prevent perinatal human immunodeficiency virus (HIV) transmission**. The Panel reaffirms the importance of providing antiretroviral drugs during pregnancy, labor, and to the infant for optimal prevention of transmission; that combination antiretroviral regimens are more effective than single-drug regimens in reducing transmission; and that antiretroviral prophylaxis to prevent perinatal HIV transmission should be offered to all HIV-infected women, regardless of CD4 cell count.
- **Issues on preconception care of HIV-infected women of childbearing age**. The Panel notes that contraceptive counseling is an essential component of care for HIV-infected women of reproductive age. The Panel also notes that choice of an antiretroviral regimen for treatment of HIV-infected women of childbearing potential needs to include consideration of effectiveness for treatment of maternal disease as well as teratogenic potential of the drugs should pregnancy occur. Attainment of a stable, maximally suppressed viral load prior to conception is recommended for HIV-infected women who are on antiretroviral therapy and wish to become pregnant.
- **Antepartum Management**. The Panel reaffirms recommendations for use of three-drug combination antiretroviral regimens for prevention of perinatal HIV transmission. New sections have been added regarding management of pregnant women with prior antiretroviral exposure, management of pregnant women with hepatitis B and hepatitis C coinfection, stopping antiretroviral therapy in pregnancy, management of women who fail to achieve viral suppression, and monitoring of the woman and fetus during pregnancy. The Panel recommends resistance testing for all HIV-infected pregnant women prior to initiation of treatment or prophylaxis and for women on treatment who have persistently detectable HIV-ribonucleic acid (RNA) levels.
- **Intrapartum Management**. The Panel continues to recommend scheduled cesarean delivery for HIV-infected pregnant women with HIV RNA levels >1,000 copies/mL near the time of delivery. New information has been added regarding antiretroviral drug continuation during labor and management of women who have not received antepartum antiretroviral drugs, as well as choice of intrapartum prophylaxis regimen for such women.
- **Postpartum Management**. The Panel provides further detail on decision making related to whether to continue or stop antiretroviral drugs postpartum, reiterates that HIV-infected women in the United States should not breastfeed (even if receiving antiretroviral therapy), and discusses contraceptive counseling.
- **Infant Management**. New sections have been added regarding the management and choice of antiretroviral prophylaxis in the infant in situations where the mother has received antepartum antiretroviral drugs, only received intrapartum antiretroviral prophylaxis, or did not receive any prophylaxis, and more detailed information is provided on management of the infant with toxicities related to antiretroviral prophylaxis.

Lessons from Clinical Trials of Antiretroviral Interventions to Reduce Perinatal HIV Transmission

Mechanisms of Action of Antiretroviral Prophylaxis in Reducing Perinatal HIV Transmission

Panel's Recommendations

- Antiretroviral drugs reduce perinatal transmission by several mechanisms, including lowering maternal antepartum viral load, and pre- and post-exposure prophylaxis of the infant. Therefore, for prevention of perinatal HIV transmission, combined antepartum, intrapartum, and infant antiretroviral prophylaxis is recommended.

International Clinical Trials of Short-Course Regimens for Prevention of HIV Perinatal Transmission

Panel's Recommendations

- Combination antepartum antiretroviral drug regimens are more effective than single-drug regimens in reducing perinatal transmission.
- Longer duration of antepartum antiretroviral prophylaxis (e.g., starting at 28 weeks gestation) is more effective than shorter duration (e.g., starting at 36 weeks gestation); therefore, for women who do not require immediate initiation of therapy for their own health, prophylaxis should be started by 28 weeks gestation (see "Recommendations for Use of Antiretroviral Drugs during Pregnancy," below).
- If women do not receive antepartum antiretroviral drugs, intrapartum combined with infant antiretroviral prophylaxis should be given to reduce the risk of perinatal transmission (see "Intrapartum Care," below), although this is not as effective as when antepartum therapy is also given.
- If women do not receive antepartum or intrapartum antiretroviral drugs, postnatal infant antiretroviral prophylaxis is recommended with a minimum of 6 weeks of zidovudine (ZDV) (see "Postpartum Care," below).
- In the United States, the addition of single-dose intrapartum/newborn nevirapine (NVP) to the standard antepartum combination antiretroviral regimens used for prophylaxis or treatment in pregnant women is not recommended because it does not appear to provide additional efficacy in reducing transmission and may be associated with the development of NVP resistance.

Perinatal HIV Transmission and Maternal HIV RNA Copy Number

Panel's Recommendations

- Antiretroviral prophylaxis to prevent perinatal HIV transmission should be provided to all HIV-infected women, regardless of HIV RNA copy number.

Preconceptional Counseling and Care for HIV-Infected Women of Childbearing Age

Panel's Recommendations

- Select effective and appropriate contraceptive methods to reduce the likelihood of unintended pregnancy. Contraceptive counseling is an essential component of care for HIV-infected women of reproductive age.
- Preconception counseling on safe sexual practices and eliminating alcohol, illicit drug use, and smoking are important both for maternal health as well as for fetal/infant health should the woman become pregnant.
- Choice of an antiretroviral regimen for treatment of HIV-infected women of childbearing potential needs to include consideration of effectiveness for treatment of maternal disease and the drug's potential for teratogenicity should pregnancy occur.
- Attainment of a stable maximally suppressed viral load prior to conception is recommended for HIV-infected women who are on antiretroviral therapy and wish to become pregnant.

The Centers for Disease Control and Prevention (CDC), the American College of Obstetrics and Gynecology (ACOG), and other national organizations recommend offering all women of childbearing age the opportunity to receive preconception counseling and care as a component of routine primary medical care. The purpose of preconception care is to improve the health of each woman prior to conception by identifying risk factors for adverse maternal or fetal outcome, providing education and counseling targeted to the patient's individual needs, and treating or stabilizing medical conditions to optimize maternal and fetal outcomes. Preconception care is not a single clinical visit, but rather a process of ongoing care and interventions integrated into primary care to address the needs of women during the different stages of reproductive life. Because more than half of all pregnancies are unintended, it is important that preconception care be integrated into routine health visits. Therefore, HIV care providers who routinely care for women of reproductive age play an important role in promoting preconception health.

The fundamental principles of preconception counseling and care have been outlined by the CDC Preconception Care Work Group (see the NGC summary of the CDC guideline: Recommendations to Improve Preconception Health and Health Care). In addition to the general components of preconception counseling and care that are appropriate for all women of reproductive age, HIV-infected women have specific needs that should be addressed. Since many women infected with HIV are aware of their HIV status prior to pregnancy, there may be opportunities to address issues that impact pregnancy prior to conception during routine medical care for their HIV disease. In addition to those outlined by the CDC Preconception Care Work Group, the following components of preconception counseling and care are recommended for HIV-infected women:

a. Select effective and appropriate contraceptive methods to reduce the likelihood of unintended pregnancy. Providers should be aware of potential interactions of antiretroviral drugs with hormonal contraceptives that could

lower contraceptive efficacy (See the Guidelines for the Use of Antiretroviral Agents in HIV-Infected Adults and Adolescents, Tables 21a and 21b.)

b. Counsel on safe sexual practices that prevent HIV transmission to sexual partners and protect women from acquiring sexually transmitted diseases (STDs) and the potential to acquire more virulent or resistant HIV strains.
c. Counsel on eliminating alcohol, illicit drug use, and cigarette smoking.
d. Educate and counsel women about risk factors for perinatal HIV transmission, strategies to reduce those risks, and potential effects of HIV or treatment on pregnancy course and outcomes.
e. When prescribing antiretroviral treatment to women of childbearing potential, considerations should include the regimen's effectiveness for treatment of HIV disease and the drugs' potential for teratogenicity should pregnancy occur. Women who are planning to get pregnant should strongly consider use of antiretroviral regimens that do not contain efavirenz (EFV) or other drugs with teratogenic potential. In addition, the effectiveness of a regimen in preventing mother-to-child HIV transmission should be considered.
f. Attain a stable, maximally suppressed maternal viral load prior to conception in women who are on antiretroviral therapy and want to get pregnant.
g. Evaluate and control for therapy-associated side effects which may adversely impact maternal-fetal health outcomes (e.g., hyperglycemia, anemia, hepatic toxicity).
h. Evaluate for appropriate prophylaxis for opportunistic infections and administration of medical immunizations (e.g., influenza, pneumococcal, or hepatitis B vaccines) as indicated.
i. Encourage sexual partners to receive HIV testing and counseling and appropriate HIV care if infected.
j. Counsel regarding available reproductive options, such as intrauterine or intravaginal insemination, that prevent HIV exposure to an uninfected partner; expert consultation is recommended.
k. Breastfeeding by HIV-infected women is not recommended in the U.S. due to risk of HIV transmission.

Management of Pregnant Women with a Partner Known to Be HIV Infected

Increasingly clinicians may be faced with the situation in which an HIV-uninfected woman presents during pregnancy who relates that she has an HIV-infected partner. As is recommended for all pregnant women, the woman should be notified that HIV screening is recommended and that she will receive an HIV test as part of the routine panel of prenatal tests unless she declines. In addition, she should receive a second HIV test during the third trimester, preferably before 36 weeks of gestation, as is recommended for high-risk women. Furthermore, if the pregnant woman presents in labor with incomplete HIV testing (e.g., undocumented HIV test results or only one rather than two HIV tests), then she should be screened with a rapid HIV test on the labor and delivery unit. If the clinician suspects that a pregnant woman may be in the "window" period of seroconversion (i.e., has signs or symptoms consistent with acute HIV infection), then a plasma HIV RNA test can be used in conjunction with an HIV antibody test, and HIV testing may be repeated in 4 to 6 weeks. Women should be counseled regarding the symptoms of acute retroviral syndrome (i.e., fever, pharyngitis, rash, myalgia, arthralgia, diarrhea, headache) and the importance of seeking medical care and testing if she experiences such symptoms.

If results from either conventional or rapid HIV testing are positive, then the woman should receive interventions to reduce perinatal HIV transmission, including immediate initiation of appropriate antiretroviral prophylaxis and consideration of elective cesarean delivery according to established guidelines (see "Transmission and Mode of Delivery," below). In cases where confirmatory testing results are not readily available (e.g., rapid testing during labor) then it is appropriate to initiate interventions to reduce perinatal transmission even in the absence of confirmatory testing (see "Infant Antiretroviral Prophylaxis," below). If HIV testing results are negative, then pregnant women with HIV-infected partners should be regularly counseled regarding the ongoing risk of HIV transmission. If the partner's HIV status is at all uncertain, he should be encouraged to seek testing and appropriate care. All women and their partners should be counseled about the importance of correct and consistent condom use.

Antepartum Care

General Principles Regarding Use of Antiretroviral Drugs During Pregnancy

Panel's Recommendations

- Initial evaluation of an infected pregnant woman should include an assessment of HIV disease status and recommendations regarding antiretroviral treatment or alteration of her current antiretroviral regimen.
- The known benefits and potential risks of antiretroviral use during pregnancy should be discussed with all women.
- Antiretroviral therapy or antiretroviral prophylaxis for prevention of perinatal HIV transmission during the antepartum period should be recommended to all pregnant, HIV-infected women regardless of plasma HIV RNA copy number or CD4 cell count.
- ZDV should be included in the antenatal antiretroviral regimen unless there is severe toxicity or documented resistance.
- If HIV RNA is detectable, antiretroviral drug resistance studies should be performed before starting/modifying therapy (see "Antiretroviral Drug Resistance and Resistance Testing in Pregnancy," below).
- The importance of adherence to the antiretroviral treatment or prophylaxis regimen should be emphasized.
- Coordination of services among prenatal care providers, primary care and HIV specialty care providers, mental health and drug abuse treatment services, and public assistance programs, if necessary, should be assured as part of recommending antiretroviral drugs during pregnancy.

Medical care of the HIV-infected pregnant woman requires coordination and communication between HIV-specialists and obstetrical providers. General counseling should include current knowledge regarding risk factors for perinatal transmission. Cigarette smoking, illicit drug use, genital tract infections, and unprotected sexual intercourse with multiple partners during pregnancy have been associated with risk for perinatal HIV transmission; in addition to improving maternal health, discontinuing cigarette smoking and drug use, treatment of genital tract infections, and use of condoms with sexual intercourse during pregnancy may also reduce risk of perinatal transmission. In addition, the CDC

recommends that HIV-infected women in the United States (including those receiving antiretroviral therapy) refrain from breastfeeding to avoid postnatal transmission of HIV to their infants through breast milk.

In addition to the standard antenatal assessments for all pregnant women, the initial evaluation of an HIV-infected pregnant woman should include an assessment of HIV disease status and recommendations regarding antiretroviral treatment or alteration of her current antiretroviral regimen. This initial assessment should include the following:

a. Evaluation of the degree of existing immunodeficiency determined by past and current CD4 count
b. Evaluation of the risk for disease progression and perinatal HIV transmission as determined by current plasma HIV RNA copy number
c. Assessment of the need for prophylaxis against opportunistic infections such as *Pneumocystis jirovecii* pneumonia (PCP) or *Mycobacterium avium* complex (MAC)
d. Baseline evaluation with complete blood cell count, and renal and liver function testing
e. History of prior and current antiretroviral therapy
f. History of prior antiretroviral drug use for prevention of perinatal HIV transmission
g. Results of prior and current HIV antiretroviral drug resistance studies
h. Assessment of supportive care needs

Decisions regarding initiation of or alterations to antiretroviral therapy and the choice of antiretroviral regimens during pregnancy are complex. Factors influencing benefit and risk that are unique to pregnancy in addition to those common to all HIV-infected adults must be weighed. General guidelines for the use of antiretroviral drug treatment for the benefit of maternal health are the same as for women who are not pregnant. In addition, there are recommendations for the use of antiretroviral drugs for prophylaxis to prevent perinatal HIV transmission even in women for whom therapy would not otherwise be indicated.

In general, if plasma HIV RNA is detectable, antiretroviral drug resistance studies should be performed before starting antiretroviral therapy or prophylaxis. However, if HIV is diagnosed late in pregnancy, therapy should be initiated while awaiting results of resistance testing (see "Antiretroviral Drug Resistance and Resistance Testing in Pregnancy," below).

Maternal toxicities and risks of therapy must be considered, along with the additional considerations of the potential impact of such therapy on the outcome of pregnancy and on the fetus and infant. These decisions are further complicated because there are only limited data on the long-term consequences for the woman on the use of antiretroviral drugs only during pregnancy for prophylaxis of transmission. Similarly, there are only limited data on the long-term consequences of *in utero* antiretroviral exposure for the infant.

Decisions regarding the use and choice of an antiretroviral regimen should be individualized based on the following factors:

a. Gestational age of the pregnancy
b. Antiretroviral treatment recommendations for the health of the HIV-infected woman
c. The efficacy of antiretroviral regimens for prevention of perinatal HIV transmission
d. Known, suspected, and in some cases unknown effects of particular drugs or regimens on the fetus and newborn, on the outcome of pregnancy, and for the woman
e. HIV antiretroviral drug resistance studies

Discussion of treatment options with a pregnant woman should be noncoercive, and the final decision regarding use of antiretroviral drugs is the responsibility of the woman. The known benefits and known and unknown risks of such therapy during pregnancy should be considered and discussed. Results from preclinical and animal studies and available clinical information about use of the various antiretroviral agents during pregnancy should be discussed with the woman (see Table 2 and 3 in the original guideline document). Risks of these drugs during pregnancy should be placed in perspective by also discussing benefits of antiretroviral therapy for the health of the infected woman and for reducing the risk for HIV transmission to her infant.

Perinatal HIV transmission can occur even at low or undetectable HIV RNA copy numbers. Thus, HIV RNA levels should not be a determining factor when deciding whether to use antiretroviral drugs for prevention of perinatal transmission. Additionally, the efficacy of antiretroviral drugs is not solely related to lowering viral load. Therefore, antiretroviral prophylaxis should be recommended even to women who have a very low or undetectable viral load on no therapy.

Discussion with the woman about initiation of antiretroviral therapy should include the following:

a. Maternal risk for disease progression and the benefits and risks of initiation of therapy for her own health
b. Benefit of lowering HIV viral load to reduce the risk of perinatal transmission
c. Benefit of antiretroviral prophylaxis independent of the effect on viral load as well as the additive benefit of combination antiretroviral regimens for preventing perinatal HIV transmission
d. The possibility of development of drug resistance, including the need for strict adherence to the prescribed drug schedule to avoid its development, as well as the increased likelihood of development of resistance in the setting of high viral loads with use of nonsuppressive therapy
e. The limited long-term outcome data for both infants with *in utero* antiretroviral exposure and for women who temporarily use antiretroviral drugs for prophylaxis of transmission

The importance of adherence to the antiretroviral treatment or prophylaxis regimen should be emphasized. Depending on individual circumstances, provision of support services, mental health services, and drug abuse treatment may be required. Coordination of services among prenatal care providers, primary care and HIV specialty care providers, mental health and drug abuse treatment services, and public assistance programs is essential to ensure adherence of the infected woman to antiretroviral treatment regimens. Long-range plans should be

developed with the woman regarding continuity of medical care and decisions about antiretroviral therapy for her own health after the birth of her infant.

Recommendations for Use of Antiretroviral Drugs During Pregnancy

Recommendations for antiretroviral therapy during pregnancy must be individualized according to the specific antiretroviral history of the HIV-infected pregnant woman. Some women may be receiving antiretroviral therapy for their own health at the time they become pregnant, and present for obstetrical care on such therapy. Other HIV-infected women may not be receiving antiretroviral therapy at the time they present for obstetrical care. Some of these women will never have received antiretroviral drugs before, while other women may have previously received antiretroviral drugs, either for treatment that was stopped or for prophylaxis to prevent perinatal HIV transmission in prior pregnancies. Considerations for initiating therapy will differ for such women according to whether antiretroviral drugs are currently indicated for maternal health or solely for fetal protection. The antiretroviral recommendations below are divided into sections according to antiretroviral treatment status at the time the woman presents for care and whether there are indications for therapy.

Although data are insufficient to support or refute the teratogenic risk of antiretroviral drugs when administered during the first 10 weeks of gestation, information to date does not support major teratogenic effects of the majority of antiretroviral drugs. However, certain drugs are of more concern than others (see Table 2 and "Teratogenicity" in the original guideline document and the supplement "Safety and Toxicity of Individual Antiretroviral Drugs in Pregnancy" [see "Availability of Companion Documents" field]). For example, EFV should be avoided during the first trimester of pregnancy.

Three-drug combination regimens including nelfinavir have had extensive use in pregnancy. However, in September 2007, the U.S. manufacturer, Pfizer, sent a letter to providers regarding the presence of ethyl methane sulfonate (EMS), a process-related impurity, in Viracept (nelfinavir mesylate) available in the United States. Health care providers were advised not to initiate antiretroviral regimens containing Viracept (nelfinavir) in their pregnant female or new pediatric patients and to switch pregnant patients receiving Viracept (nelfinavir) to alternative therapy unless no alternative was available. As of March 31, 2008, all Viracept (nelfinavir) manufactured and released by Pfizer now meets the new final EMS limits established by the FDA for prescribing to all patient populations, including pregnant women and pediatric patients. Viracept (nelfinavir) may now be prescribed for pregnant women as an alternate PI for women receiving antiretroviral therapy during pregnancy solely for prevention of maternal-to-child transmission.

Table 3 in the original guideline document provides recommendations about use of specific antiretroviral drugs in pregnancy as well as data on pharmacokinetics and toxicity in pregnancy. Table 4 in the original guideline document provides a summary of management recommendations for the mother and infant in a variety of clinical scenarios.

HIV-Infected Pregnant Women Who Are Currently Receiving Antiretroviral Treatment

Panel's Recommendations

- Continue the antiretroviral treatment regimen if it is currently effective in suppressing viral replication; however, avoid use of EFV in the first trimester of pregnancy.
- HIV antiretroviral drug resistance testing is recommended if the woman has detectable viremia* on therapy (see "Failure of Viral Suppression," below).
- Pregnant women receiving NVP-containing regimens who are virologically suppressed and tolerating the regimen should continue therapy, regardless of CD4 count.

*Dependent on the resistance assay being used; some assays require HIV RNA levels of $\geq$1,000 copies/mL for performance of the resistance assay, while other assays can be used with lower levels of viral replication.

While ZDV should be a component of the antenatal antiretroviral treatment regimen, there may be circumstances, such as the occurrence of severe ZDV-related toxicity or documented ZDV resistance, when this is not possible. Additionally, women receiving an antiretroviral regimen that does not contain ZDV but who have HIV RNA levels that are undetectable have a very low risk of perinatal transmission, and there may be concerns that substitution of ZDV for another component of the regimen or the addition of ZDV to the current regimen could compromise adherence to treatment. In such cases, continuing a non-ZDV-containing regimen that is fully suppressive is reasonable.

In general, women who have been receiving antiretroviral treatment for their HIV infection should continue treatment during pregnancy. Discontinuation of therapy could lead to an increase in viral load, which could result in a decline in immune status and disease progression as well as adverse consequences for both the fetus and the woman, including increased risk of HIV transmission. Therefore, HIV-infected women receiving antiretroviral therapy at the time of conception whose pregnancy is identified after the first trimester should always continue therapy.

HIV-infected women receiving antiretroviral treatment who present for care during the first trimester of pregnancy should be counseled regarding the benefits and potential risks of antiretroviral administration during this period, and continuation of therapy should be recommended. However, EFV should be avoided during the first trimester of pregnancy. If a woman is receiving EFV and her pregnancy is recognized during the first trimester, substitution of an alternative antiretroviral drug is recommended when possible (see "Monitoring of the Woman and Fetus during Pregnancy," below).

Pregnant women who are receiving NVP-containing regimens with viral suppression and are tolerating the regimen well should continue therapy, regardless of CD4 count. While hepatic toxicity is a concern in women with a CD4 count >250 cells/mm^3 at the time they first initiate an NVP-containing regimen, an increased risk of hepatic toxicity has not been seen in women who are receiving NVP-based therapy and have immune reconstitution with therapy.

HIV-Infected Pregnant Women Who Have Never Received Antiretroviral Drugs (Antiretroviral-Naïve)

Panel's Recommendations

- HIV-infected pregnant women who meet standard criteria for initiation of antiretroviral therapy per adult antiretroviral treatment guidelines should receive standard potent combination antiretroviral therapy as recommended for nonpregnant adults, taking into account what is known about use of specific drugs in pregnancy (see Table 3 in the original guideline document).
    - For women who require immediate initiation of therapy for their own health, treatment should be initiated as soon as possible, including in the first trimester.
- HIV-infected pregnant women who do not require treatment for their own health should also receive three-drug combination antiretroviral regimens for prophylaxis of perinatal transmission; use of ZDV prophylaxis alone is controversial, but may be considered for those women initiating prophylaxis with plasma HIV RNA levels <1,000 copies/mL on no therapy.
    - For women who are receiving antiretroviral drugs solely for prevention of perinatal transmission, delaying initiation of prophylaxis until after the first trimester can be considered.
- Use of ZDV as a component of the antiretroviral regimen is recommended when feasible.
- NVP can be used as a component of initial therapy for pregnant women with CD4 cell counts <250 cells/mm^3, but should only be used as a component of antiretroviral therapy in pregnant women with CD4 cell counts >250 cells/mm^3 if the benefit clearly outweighs the risk due to an increased risk of hepatic toxicity.

Pregnant women with HIV infection should receive standard clinical, immunologic, and virologic evaluation. Decisions about the need for initiation of therapy should be based on standard guidelines in nonpregnant adults.

<u>HIV-Infected Pregnant Women Not on Antiretroviral Therapy and Who Need Antiretroviral Treatment for Their Own Health</u>

Any HIV-infected pregnant woman who meets standard criteria for initiation of antiretroviral therapy as per adult antiretroviral guidelines should receive potent combination antiretroviral therapy, generally consisting of two nucleoside reverse transcriptase inhibitors (NRTIs) plus a non-nucleoside reverse transcriptase inhibitor (NNRTI) or protease inhibitor(s), with continuation of therapy postpartum. For women who require immediate initiation of therapy for their own health, treatment should be started as soon as possible, including in the first trimester, as the potential benefit of treatment for the mother outweighs potential fetal risks. The regimen should be chosen from those recommended for nonpregnant adults taking into account what is known about use of the drugs during pregnancy and risk of teratogenicity (see Table 3 and "Teratogenicity" in the original guideline document).

Women with CD4 counts >250 cells/mm^3 have an increased risk of developing symptomatic, often rash-associated, NVP-related hepatotoxicity, which can be severe, life-threatening, and in some cases fatal. Therefore, NVP should only be used as a component of a combination regimen when antiretroviral therapy is being initiated in women with CD4 counts >250 cells/mm^3 if the benefit clearly

outweighs risk. If NVP is used, frequent and careful monitoring of transaminase levels, particularly during the first 18 weeks of treatment, is required (see "Nevirapine and Hepatic/Rash Toxicity" in the original guideline document). Transaminase levels should be checked in all women who develop a rash while receiving NVP. NVP should be stopped immediately in all women who develop signs or symptoms of hepatitis.

HIV-Infected Pregnant Women Not on Antiretroviral Therapy Who Require Antiretroviral Prophylaxis Solely to Prevent Perinatal HIV Transmission

HIV-infected pregnant women should be counseled regarding the benefits of antiretroviral therapy for prevention of perinatal transmission even when initiation of antiretroviral therapy is not recommended or considered optional on the basis of current guidelines for treatment of nonpregnant persons. Although such women are at low risk for clinical disease progression if antiretroviral treatment is delayed, use of an antiretroviral regimen that successfully reduces plasma HIV RNA to undetectable levels substantially lowers the risk of perinatal HIV transmission and lessens the need for consideration of elective cesarean delivery as an intervention to reduce transmission risk.

Because the fetus is most susceptible to the potential teratogenic effects of drugs during the first 10 weeks of gestation and the risks of antiretroviral therapy during that period are not fully known, women in the first trimester of pregnancy who do not require immediate initiation of therapy for their own health may consider delaying initiation until after 10 to 12 weeks gestation. This decision should be carefully considered by the health-care provider and the patient; a discussion should include an assessment of the woman's health status, the benefits and risks to her of delaying initiation of therapy for several weeks, and the fact that most perinatal HIV transmission likely occurs late in pregnancy or during delivery.

Antiretroviral prophylaxis is recommended for all pregnant women with HIV infection, regardless of viral load. While rates of perinatal transmission are low in women with undetectable or low HIV RNA levels (e.g., <1,000 copies/mL), there is no threshold below which lack of transmission can be assured. The mechanism by which antiretroviral drugs reduce perinatal HIV transmission is multifactorial. While lowering maternal antenatal viral load is an important component of prevention in women with higher viral load, antiretroviral prophylaxis is effective even in women with low viral load and when maternal antenatal therapy is unable to be given. Additional mechanisms of protection include pre-exposure prophylaxis of the infant, provided by passage of the antiretroviral drug across the placenta so that inhibitory levels of drug are present in the fetus during the birth process, and post-exposure prophylaxis through continued administration to the infant. Although placental passage of ZDV is excellent, that of other antiretroviral drugs may be variable (see Table 2 in the original guideline document). Therefore, when combination antiretroviral therapy is initiated during pregnancy, ZDV should be included as a component of antenatal therapy whenever possible. If antenatal ZDV use is not possible, at least one agent with known transplacental passage should be part of the antiretroviral regimen (see Table 2 in the original guideline document).

Combination antiretroviral regimens containing at least three drugs (i.e., highly active antiretroviral therapy [HAART]) for prevention of perinatal HIV transmission should be discussed and offered to all pregnant women with HIV infection.

If HAART is given solely to reduce perinatal transmission, would not have been needed if the woman were not pregnant, and will be stopped postpartum, use of a three-drug regimen that is not considered to be one of the standard first-line regimens used for adults who require therapy may be considered. However, the regimen should be among those considered an alternative effective treatment for adults. In particular, the triple NRTI combination ZDV/lamivudine/abacavir (ZDV/3TC/ABC) regimen may be considered because of known pharmacokinetics profiles and published data suggesting acceptable toxicities during pregnancy. However, this regimen has inferior long-term virologic efficacy, and for women with high CD4 count but high viral load (i.e., CD4 count >350/mm^3 and HIV RNA >100,000 copies/mL), use of first-line, more potent regimens should be considered. Dual NRTI therapy without the addition of a third drug (i.e., a protease inhibitor, NNRTI, or a third NRTI) is not recommended because of the potential for inadequate viral suppression and rapid development of resistance.

The time-limited use of ZDV monotherapy during pregnancy for chemoprophylaxis against perinatal transmission is controversial. However, some women may wish to restrict exposure of their fetus to antiretroviral drugs during pregnancy while still reducing the risk of transmitting HIV to their infants. Additionally, for women with low viral load, time-limited use of ZDV during the second and third trimesters of pregnancy is less likely to induce the development of resistance than in women with higher viral loads because of the low level of viral replication in the patient and the short duration of exposure to the antiretroviral drug. Thus, while controversial, the use of ZDV chemoprophylaxis alone during pregnancy might be an appropriate option for this subset of women (i.e., women with HIV RNA levels <1,000 on no treatment).

In general, if antiretroviral therapy is given solely for prevention of perinatal HIV transmission, the antiretroviral drugs are discontinued postnatally, with the option to reinitiate standard potent treatment regimens in the future according to usual criteria for nonpregnant individuals. Discussion regarding the decision to continue or stop treatment postpartum should occur before beginning therapy during pregnancy. Generally, when drugs are discontinued postnatally, all drugs should be stopped simultaneously. However, as discussed later (see "Stopping Antiretroviral Therapy during Pregnancy," below), in women receiving NNRTI-based regimens, continuing the dual NRTI backbone for a period of time (e.g., 7 days) after stopping the NNRTI should be considered to prevent the development of NNRTI resistance.

HIV-Infected Pregnant Women Who Have Previously Received Antiretroviral Treatment or Prophylaxis But Are Not Currently Receiving Any Antiretroviral Medications

Panel's Recommendations

- Obtain an accurate history of all prior antiretroviral regimens used for treatment of HIV disease or prevention of transmission and results of prior resistance testing.

- Perform HIV antiretroviral drug resistance testing prior to initiating repeat antiretroviral prophylaxis or therapy.
- Initiate HAART, with regimen chosen based on resistance testing and prior therapy history, and avoid drugs with teratogenic potential (EFV) or with known adverse potential for the pregnant mother (combination stavudine [d4T]/didanosine [ddI]).
- Women who do not show an appropriate virologic response to their antiretroviral regimen (see "Monitoring of the Woman and Fetus During Pregnancy," below) require repeat antiretroviral drug resistance testing, as well as consultation with a clinician experienced in HIV treatment, to guide changes in antiretroviral therapy.

Special Situations

Hepatitis B Virus Coinfection

Panel's Recommendations

- Screening for hepatitis B surface antigen is recommended for all HIV-infected pregnant women who have not been screened during the current pregnancy.
- Interferon-alpha and pegylated interferon alpha are not recommended during pregnancy.
- For pregnant women with chronic hepatitis B virus (HBV) (i.e., hepatitis B surface antigen positive for >6 months)/HIV coinfection who require antiretroviral treatment for HIV disease or who require anti-HBV therapy, a three-drug regimen including a dual NRTI backbone of tenofovir plus 3TC or emtricitabine (FTC) is recommended.
    - For women who require treatment of HBV but not HIV, postpartum options include stopping antiretroviral drugs and initiating pegylated interferon-alpha for HBV treatment, or continuing the three-drug antiretroviral regimen. Consultation with an expert is advised.
- For pregnant women with HBV/HIV coinfection who do not require treatment for either HIV or HBV and therefore discontinue prophylaxis postpartum, consultation with an expert in HIV and HBV is recommended.
    - Many experts would give an antepartum three-drug regimen including the dual NRTI backbone of tenofovir plus 3TC or FTC and discontinue the regimen postpartum, with careful monitoring postpartum for HBV disease flare, which could be treated with HBV-specific therapy such as pegylated interferon-alpha.
    - Alternatively, some experts would give an antepartum three-drug regimen including a dual NRTI backbone that does not contain tenofovir, 3TC, or FTC (e.g., ZDV + ddI), with discontinuation postpartum.
- Pregnant women with HBV/HIV coinfection receiving antiretroviral drugs should be counseled about signs and symptoms of liver toxicity and transaminases should be assessed 2 weeks following initiation of antiretroviral therapy or prophylaxis and then at least monthly.
- Infants born to women with hepatitis B infection should receive hepatitis B immune globulin (HBIG) and initiate the three-dose hepatitis B vaccination

series within 12 hours of birth.

Hepatitis C Virus Coinfection

Panel's Recommendations

- Screening for hepatitis C virus (HCV) infection is recommended for all HIV-infected pregnant women who have not been screened during the current pregnancy.
- Pegylated interferon-alpha is not recommended and ribavirin is contraindicated during pregnancy.
- Combination antiretroviral therapy with three drugs should be considered for all HCV/HIV coinfected pregnant women, regardless of CD4 count or HIV viral load; the antiretroviral drugs can be discontinued postpartum in women who do not require HIV therapy for their own health.
- Pregnant women with HCV/HIV coinfection receiving antiretroviral drugs should be counseled about signs and symptoms of liver toxicity, and transaminases should be assessed 2 weeks following initiation of antiretroviral therapy or prophylaxis in women not already receiving drugs, and then at least monthly.
- Decisions concerning mode of delivery in HCV/HIV coinfected pregnant women should be based on considerations related to HIV infection alone (see "Intrapartum Care," below).
- Infants born to women with HCV/HIV coinfection should be evaluated for HCV infection by HCV RNA testing between 2 and 6 months of age and/or HCV antibody testing after 15 months of age.

Stopping Antiretroviral Therapy During Pregnancy

Panel's Recommendations

- If antiretroviral therapy is stopped electively and the patient is receiving an NNRTI drug, consideration should be given to stopping the NNRTI first, and continuing the other antiretroviral drugs for a period of time (e.g., 7 days); however, the optimal interval between stopping an NNRTI and the other antiretroviral drugs is not known.
- If antiretroviral therapy is stopped acutely for severe or life-threatening toxicity or severe pregnancy-induced hyperemesis unresponsive to anti-emetics, all drugs should be stopped at the same time and reinitiated at the same time.
- If NVP is stopped and more than 2 weeks have passed prior to restarting therapy, NVP should be restarted with the 2-week dose escalation period.

Failure of Viral Suppression

Panel's Recommendations

- If there is failure of viral suppression after an adequate period of treatment:
  - Assess resistance and adherence.
  - Consult an expert in the care of HIV-infected adults.
- Scheduled cesarean delivery is recommended for HIV-infected pregnant women who have HIV RNA levels >1,000 copies/mL near the time of delivery.

Monitoring of the Woman and Fetus During Pregnancy

Panel's Recommendations

- CD4 cell count should be monitored at the initial visit and at least every 3 months during pregnancy.
- Plasma HIV RNA levels should be monitored at the initial visit, 2 to 6 weeks after initiating (or changing) antiretroviral therapy, monthly until RNA levels are undetectable, and then at least every 2 months during pregnancy; HIV RNA levels should also be assessed at approximately 34 to 36 weeks gestation for decisions on mode of delivery (see "Transmission and Mode of Delivery," below).
- Antiretroviral drug resistance testing should be performed on women who have persistently detectable plasma HIV RNA levels despite receiving antiretroviral drugs for treatment or prophylaxis.
- Monitoring for complications of antiretroviral drugs during pregnancy should be based on what is known about side effects of the drugs the woman is receiving.
- First trimester ultrasound is recommended for confirmation of gestational age and potential timing for scheduled cesarean delivery, if needed (see "Transmission and Mode of Delivery," below).
- Most experts would recommend assessment of fetal anatomy with second trimester ultrasound evaluation in women who have received combination antiretroviral therapy (particularly if the regimen included EFV) during the first trimester given the limited data on the effect of combination therapy on the fetus.

Special Considerations Regarding the Use of Antiretroviral Drugs by HIV-Infected Pregnant Women and Their Infants

Panel Recommendations

- All cases of antiretroviral drug exposure during pregnancy should be reported to the Antiretroviral Pregnancy Registry (see details at http://www.APRegistry.com).
- Some protease inhibitors require altered dosing during pregnancy (see Table 3 in the original guideline document).
- EFV is an FDA Pregnancy Category D drug because of animal data showing an increased risk of central nervous system (CNS) defects and a small number of concerning case reports in humans. EFV should not be used in the first trimester of pregnancy, and women on EFV should be counseled to avoid pregnancy.

- Women with CD4 counts >250 cells/mm^3 initiating NVP regimens have an increased risk of developing symptomatic, often rash-associated, NVP-related hepatotoxicity, which can be severe, life-threatening, and in some cases fatal. NVP should only be used in this setting if the benefits clearly outweigh the risks.
- Because of the potential for lactic acidosis with prolonged use of the combination of d4T and ddI by HIV-infected pregnant women, clinicians should not prescribe this antiretroviral combination during pregnancy unless no other antiretroviral options are available and potential benefits outweigh the risks.
- Because NRTI drugs may be associated with development of lactic acidosis, pregnant women receiving NRTI drugs should have hepatic enzymes and electrolytes assessed monthly during the last trimester of pregnancy and any new symptoms should be evaluated thoroughly.
- HIV-infected women receiving antiretroviral therapy during pregnancy should receive glucose screening with a standard, 1-hour, 50-gram glucose loading test at 24 to 28 weeks of gestation. Some experts would perform earlier glucose screening in women with ongoing chronic protease inhibitor-based therapy initiated prior to pregnancy, similar to recommendations for women with high-risk factors for glucose intolerance such as maternal obesity, advanced maternal age, and family history of type II diabetes mellitus.

Recommendations regarding the choice of antiretroviral drugs for treatment of HIV-infected pregnant women are subject to unique considerations. These include:

a. Possible changes in dosing requirements resulting from physiologic changes associated with pregnancy
b. Potential toxicities of antiretroviral drugs that may be magnified in the pregnant woman
c. The potential short- and long-term effects of the antiretroviral drug on the fetus and newborn, including the potential for teratogenicity, mutagenicity, or carcinogenicity, which may not be known for certain antiretroviral drugs
d. The pharmacokinetics and toxicity of transplacentally transferred drugs

Treatment recommendations for pregnant women infected with HIV have been based on the concept that therapies of known benefit to women should not be withheld during pregnancy unless there are known adverse effects on the mother, fetus, or infant and unless these adverse effects outweigh the benefit to the woman. Pregnancy should not preclude the use of optimal therapeutic regimens. The decision to use any antiretroviral drug during pregnancy should be made by the woman after discussing with her health care provider the known and potential benefits and risks to her and her fetus.

See the original guideline document for information on pharmacokinetic changes, teratogenicity, combination antiretroviral therapy and pregnancy outcome, nevirapine and hepatic/rash toxicity, protease inhibitor therapy and hyperglycemia, and mitochondrial toxicity and NRTI drugs.

Antiretroviral Drug Resistance and Resistance Testing in Pregnancy

Indications for Antiretroviral Drug Resistance Testing in HIV-Infected Pregnant Women

Panel's Recommendations

- HIV drug resistance testing is recommended for:
  - All pregnant women not currently receiving antiretrovirals, before starting treatment or prophylaxis.
  - All pregnant women receiving antenatal antiretroviral therapy who have virologic failure with persistently detectable HIV RNA levels or who have suboptimal viral suppression after initiation of antiretroviral therapy.
- For optimal prevention of perinatal transmission, empiric initiation of antiretroviral therapy before results of resistance testing are available may be warranted, with adjustment as needed after the results are available.

Incidence of Antiretroviral Resistance with Perinatal Prophylactic Regimens

Panel's Recommendations

- The addition of single-dose maternal/infant NVP to an ongoing HAART regimen does not provide additional efficacy in reducing perinatal transmission and may result in NVP drug resistance in the mother, and is therefore not recommended.

Management of Antiretroviral Drug Resistance During Pregnancy

Panel's Recommendations

- Women who have documented ZDV resistance and are on regimens that do not include ZDV for their own health should still receive intravenous ZDV during labor whenever possible, along with their established antiretroviral regimens and oral ZDV for their infants according to the PACTG 076 protocol. For women who are receiving a d4T-containing regimen, d4T should be discontinued during labor while intravenous ZDV is being administered (see "Intrapartum Care," below).
- The optimal prophylactic regimen for newborns of women with ARV resistance is unknown (see "Infant Antiretroviral Prophylaxis," below). Therefore, ARV prophylaxis for an infant born to a woman with known or suspected drug resistance should be determined in consultation with a pediatric HIV specialist, preferably before delivery.

Prevention of Antiretroviral Drug Resistance

Panel's Recommendations

- The use of HAART to maximally suppress viral replication during pregnancy is

the most effective strategy to prevent the development of resistance and to minimize the risk of perinatal transmission.
- All pregnant women should be counseled about the importance of adherence to prescribed antiretroviral medications to reduce the potential for development of resistance.
- NVP-based combination therapy should not be initiated in women with CD4 count >250 cells/mm^3 unless the benefit clearly outweighs the risk due to concern about increased risk of hepatic toxicity (see "Nevirapine and Hepatic/Rash Toxicity" in the original guideline document). However, some pregnant women may receive an NVP-based combination antiretroviral therapy regimen for prophylaxis only, with plans to discontinue therapy after delivery. In this situation, consideration should be given to continuing the nucleoside analogue agents for 7 days after stopping NVP to minimize the risk of NVP resistance (See "Stopping Antiretroviral Therapy during Pregnancy," above and "Postpartum Follow-Up of HIV-Infected Women," below).

Intrapartum Care

Intrapartum Antiretroviral Therapy/Prophylaxis

Panel's Recommendations

- Intrapartum intravenous ZDV is recommended for all HIV-infected pregnant women, regardless of their antepartum regimen, to reduce perinatal HIV transmission.
- For women who are receiving a d4Tcontaining antepartum regimen, d4T should be discontinued during labor while intravenous ZDV is being administered.
- Women who are receiving an antepartum combination antiretroviral treatment regimen should continue this regimen on schedule as much as possible during labor and prior to scheduled cesarean section.
- Women receiving fixed-dose combination regimens that include ZDV should have ZDV administered intravenously during labor while other antiretroviral components are continued orally.
- For women who have received antepartum antiretroviral drugs but have suboptimal viral suppression near delivery (i.e., >1,000 copies/mL), scheduled cesarean delivery is recommended. The addition of intrapartum/newborn single-dose NVP is not recommended.
- Women of unknown HIV status who present in labor should have rapid HIV antibody testing performed, and intravenous ZDV initiated if the test is positive (without waiting for results of the confirmatory test), and infant ZDV initiated. A confirmatory test should be done postpartum; if positive, 6 weeks of infant ZDV is recommended, and if negative, the infant ZDV can be stopped.
- For HIV-infected women in labor who have not received antepartum antiretroviral drugs, intravenous ZDV during labor and 6 weeks of infant ZDV is recommended. Some experts would combine the intravenous intrapartum/6-week newborn ZDV regimen with single-dose intrapartum/newborn NVP.
- If single-dose NVP is given (alone or in combination with ZDV), consideration should be given to adding 3TC during labor and maternal ZDV/3TC for 7 days

postpartum, which may reduce development of NVP resistance in the woman.

Table 5 in the original guideline document shows dosing for intravenous intrapartum ZDV given in continuous infusion during labor and neonatal ZDV dosing; Table 6 in the original guideline document shows intrapartum and neonatal dosing for additional drugs to be considered in certain situations as delineated below.

Transmission and Mode of Delivery

Panel's Recommendations

- Scheduled cesarean delivery at 38 weeks gestation is recommended for women with HIV RNA levels >1,000 copies/mL near the time of delivery (whether receiving or not receiving antepartum antiretroviral drugs) and for women with unknown HIV RNA levels near the time of delivery.
- It is not clear whether cesarean delivery after rupture of membranes or onset of labor provides benefit in preventing perinatal transmission. Management of women originally scheduled for cesarean delivery who present with ruptured membranes or in labor must be individualized based on duration of rupture, progress of labor, plasma HIV RNA level, current antiretroviral therapy, and other clinical factors.
- Data are insufficient to evaluate the potential benefit of cesarean delivery for prevention of perinatal transmission in pregnant women receiving combination antiretroviral drugs with plasma HIV RNA levels <1,000 copies/mL near the time of delivery. Given the low rate of transmission among this group, it is unlikely that scheduled cesarean delivery would confer additional benefit in reduction of transmission. Decisions should be individualized based on discussion between the obstetrician and the mother.
- Although no controlled studies have evaluated the efficacy of antimicrobial prophylaxis specifically for HIV-infected women undergoing scheduled operative delivery, use of prophylactic antibiotics at the time of cesarean delivery is generally recommended.
- Women should be informed of the risks associated with cesarean delivery; the risk to the woman should be balanced with potential benefits expected for the neonate.

Table 7 in the original guideline document provides a summary of recommendations regarding mode of delivery for different clinical scenarios.

Maternal Risks of Morbidity by Mode of Delivery

Panel's Recommendations

- Cesarean delivery is associated with a somewhat greater risk of complications among HIV-infected women than observed among uninfected women.
- Scheduled cesarean delivery poses a risk greater than that of vaginal delivery and less than that of urgent or emergent cesarean delivery.
- Complications are not of sufficient frequency or severity to outweigh the

potential benefit of reduced transmission among women at heightened risk of transmission.
- Counseling should be provided regarding the increased risks and potential benefits associated with cesarean delivery based on HIV RNA levels.

Other Intrapartum Management Considerations

Panel's Recommendations

- Artificial rupture of membranes or invasive monitoring should be considered only when obstetrically indicated and the length of time for ruptured membranes or monitoring is anticipated to be short.
- Operative delivery with forceps or the vacuum extractor should be performed only in select circumstances.
- When uterine atony results in excessive postpartum bleeding in women receiving a protease inhibitor or EFV, methergine should not be used unless alternative treatments for postpartum hemorrhage are not available and if the need for pharmacologic treatment outweighs the risks; if used, it should be used in as low a dosage and for as short a duration as possible.

Postpartum Management

Postpartum Follow-up of HIV-Infected Women

Panel's Recommendations

- The decision to continue or stop antiretroviral therapy after delivery depends on the nadir CD4 count, clinical symptoms/disease stage, presence of other indications for antiretroviral therapy, and patient and provider preference.
- The immediate postpartum period poses unique challenges for adherence; new or continued supportive services should be assured prior to hospital discharge.
- Women with a positive rapid HIV antibody test during labor require comprehensive follow-up, including confirmation of HIV infection, full health assessment including evaluation for associated medical conditions, counseling related to newly diagnosed HIV infection, and assessment of need for antiretroviral therapy.
- Breastfeeding is not recommended for HIV-infected women in the United States, where safe, affordable and feasible alternatives are available and culturally acceptable.
- Contraceptive counseling is a critical aspect of postpartum care. Although condoms are universally recommended for prevention of STD/HIV transmission, the unintended pregnancy rate with condom use alone is high.
- The postpartum period provides an opportunity to review and optimize women's health care, including cervical cancer screening, routine immunizations, mental health and substance abuse treatment as indicated, and assessment for signs of postpartum depression.

Comprehensive care and support services are particularly important for women with HIV infection and their families, who often face multiple social and medical challenges. Components of comprehensive care include the following medical and supportive care services:

a. Primary, gynecologic/obstetric, pediatric, and HIV specialty care
b. Family planning services
c. Mental health services
d. Substance abuse treatment
e. Support services
f. Coordination of care through case management for the woman, her children, and other family members

Support services should be tailored to the individual woman's needs and may include case management, child care, respite care, assistance with basic life needs (e.g., housing, food, and transportation), peer counseling, and legal and advocacy services. Ideally, this care should begin before pregnancy and should be continued throughout pregnancy and postpartum.

Maternal medical services during the postpartum period must be coordinated between obstetric care providers and HIV specialists. Continuity of antiretroviral treatment when such treatment is required for the woman's HIV infection is especially critical and must be ensured. The decision whether or not to continue antiretroviral therapy after delivery will depend on the woman's nadir CD4 count, clinical symptoms/disease stage, presence of other indications for antiretroviral therapy, and patient and provider preference. Ideally, a discussion of these factors should occur well before delivery.

Concerns have been raised about adherence to antiretroviral regimens during the postpartum period. Women should be counseled about the fact that the physical and psychological changes of the postpartum period, as well as the stresses and demands of caring for a new baby, might make adherence more difficult and additional support may be needed to maintain good adherence to their therapeutic antiretroviral regimen during this period. The health care provider should be vigilant for signs of depression and illicit drug or alcohol use, which may require assessment and treatment and which may interfere with adherence. Poor adherence has been shown to be associated with virologic failure, development of resistance, and decreased long-term effectiveness of antiretroviral therapy. Efforts to maintain adequate adherence during the postpartum period might prolong the effectiveness of therapy. The "Adherence" section in the "Guidelines for the Use of Antiretroviral Agents in HIV-Infected Adults and Adolescents" is available at the AIDSinfo Web site (http://AIDSinfo.nih.gov).

Women with nadir CD4 counts <350 cells/mm^3 and/or symptomatic HIV infection should be encouraged to continue antiretroviral therapy postpartum with no interruption. For women who began antiretroviral therapy with a nadir CD4 count $\geq$350 cells/mm^3 for prophylaxis of transmission, the decision on whether to continue therapy after delivery should be made in consultation with her HIV provider, taking into account current and nadir CD4+ lymphocyte counts and trajectory, HIV RNA levels, and patient preference. For women who received an NNRTI drug as part of the antepartum regimen and who plan to stop antiretroviral therapy after delivery, consideration should be given to stopping the NNRTI and

continuing the other antiretroviral drugs for a period of time (e.g., 7 days) to decrease the risk of NNRTI resistance (see "Stopping Antiretroviral Therapy during Pregnancy," above).

Neonatal Postnatal Care

Infants Born to Mothers with Unknown HIV Infection Status

Panel's Recommendations

- For infants whose mother's HIV status is unknown postpartum, rapid HIV antibody testing of the mother or infant is recommended as soon as possible, with initiation of infant antiretroviral prophylaxis immediately if the rapid test is positive.
- If the rapid HIV antibody test is positive, standard antibody confirmatory testing (e.g., Western blot) should be performed as soon as possible. If the confirmatory test is negative, antiretroviral prophylaxis can be discontinued.

Infant Antiretroviral Prophylaxis

Panel's Recommendations

- The 6-week neonatal component of the ZDV chemoprophylaxis regimen is recommended for all HIV-exposed neonates to reduce perinatal HIV transmission.
- ZDV should be initiated as close to the time of birth as possible, preferably within 6 to 12 hours of delivery.
- The 6-week ZDV prophylaxis regimen is recommended at gestational age-appropriate doses; ZDV should be dosed differently for premature infants <35 weeks than for infants $\geq$35 weeks (see text in the original guideline document).
- The decision to combine additional drugs with the 6-week ZDV regimen should be accompanied by consultation with a pediatric HIV specialist and a discussion of the potential risks and benefits of this approach with the mother, preferably before delivery.
- Use of antiretroviral drugs other than ZDV cannot be recommended in premature infants due to lack of dosing and safety data.
- Some experts consider the use of ZDV in combination with other antiretroviral drugs in certain situations, although the optimal prophylactic regimen for infants born to women in these circumstances is unknown. These include:
    - Infants born to mothers who received antepartum and intrapartum drugs but had suboptimal viral suppression at delivery, particularly if vaginal delivery
    - Infants born to mothers who have received only intrapartum drugs
    - Infants born to mothers who have received no antepartum or intrapartum drugs
    - Infants born to mothers with known antiretroviral drug-resistant virus
- The use of intrapartum/neonatal ZDV is recommended regardless of maternal ZDV resistance history.
- Decisions regarding use of additional drugs will depend on the history of

maternal past and current antiretroviral drug exposure, maternal HIV RNA level at or near delivery, current and previous maternal resistance testing, and availability of drug formulation and dosing information in the infant. If additional drugs are used, choice of drugs should be determined in consultation with a pediatric HIV specialist.

See the original guideline document for information on dosing for full-term and premature infants, as well as general considerations for choice of infant prophylaxis, including recommendations for specific clinical situations.

Initial Postnatal Management of the HIV-Exposed Neonate

Panel's Recommendations

- A complete blood count (CBC) and differential should be performed on the newborn as a baseline evaluation before administration of ZDV.
- Decisions about the timing of subsequent monitoring of the hematologic parameters in the infant will depend on baseline hematologic values, gestational age at birth, clinical condition of the child, receipt of concomitant medications, and maternal antepartum therapy. Some experts recheck hematologic values in healthy infants receiving ZDV prophylaxis only if the child is symptomatic, while others re-check hemoglobin and neutrophil count after 4 to 6 weeks of ZDV treatment.
- Some experts recommend more intensive monitoring of hematologic and serum chemistry and liver function assays during the first few weeks of life for infants exposed to combination antiretroviral therapy *in utero* or during the neonatal period.
- If hematologic abnormalities are identified while the child is receiving prophylaxis, decisions on whether to continue infant antiretroviral prophylaxis need to be individualized. Considerations include the extent of the abnormality, whether the child has any symptoms, duration of infant prophylaxis received, the risk of HIV infection in the infant (as assessed by whether the mother had received antiretroviral prophylaxis, her viral load near delivery and mode of delivery), and availability of alternative interventions (e.g., erythropoietin or transfusion). Consultation with an expert in pediatric HIV infection is advised if discontinuation of prophylaxis is considered.
- Routine measurement of serum lactate is not recommended. However, measurement of serum lactate may be considered if an infant develops severe clinical symptoms of unknown etiology (particularly neurologic symptoms). If serum lactate is significantly abnormal (>5 mmol/L) in a child with symptoms, antiretroviral prophylaxis should be discontinued and an expert in pediatric HIV infection should be consulted regarding potential alternate prophylaxis.
- Virologic tests are required to diagnose HIV infection in infants <18 months of age and should be performed at age 14 to 21 days; 1 to 2 months; and 4 to 6 months.
- To prevent *Pneumocystis jirovecii* pneumonia (PCP), all infants born to women with HIV infection should begin PCP prophylaxis at age 6 weeks, after completion of the ZDV prophylaxis regimen, unless there is adequate test information to presumptively rule out HIV infection (see USPHS/IDSA

Guidelines for the Prevention and Treatment of Opportunistic Infections in HIV-Exposed and Infected Children).

Long-Term Follow-Up of Antiretroviral Drug-Exposed Infants

Panel's Recommendations

- Children with in utero/neonatal antiretroviral exposure who develop significant organ system abnormalities of unknown etiology, particularly of the nervous system or heart, should be evaluated for potential mitochondrial dysfunction.
- Follow-up of children with antiretroviral exposure should continue into adulthood because of the theoretical concerns regarding potential for carcinogenicity of the nucleoside analogue antiretroviral drugs.
- Long-term follow-up should include yearly physical examinations of all children exposed to antiretroviral drugs and, for adolescent females, gynecologic evaluation with Pap tests.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of evidence supporting the recommendations is not specifically stated.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Appropriate use of antiretroviral drugs in pregnant human immunodeficiency virus (HIV)-infected women for maternal health and interventions to reduce perinatal HIV transmission in the United States
- With the implementation of recommendations for universal prenatal HIV counseling and testing, antiretroviral prophylaxis, scheduled cesarean delivery, and avoidance of breastfeeding, perinatal HIV infection has dramatically diminished to less than 2% in the United States.

POTENTIAL HARMS

- **Combination antiretroviral therapy and pregnancy outcome**: Data are conflicting as to whether receipt of combination antiretroviral therapy during pregnancy is associated with adverse pregnancy outcomes, in particular preterm delivery. Until more information is known, human immunodeficiency virus (HIV) infected pregnant women who are receiving combination therapy

for their HIV infection should continue their provider-recommended regimen. They should receive careful, regular monitoring for pregnancy complications and for potential toxicities.

- **Nevirapine and hepatic/rash toxicity**: Increases in hepatic transaminase levels (alanine aminotransferase [ALT] and aspartate aminotransferase [AST]) associated with rash or systemic symptoms may be observed during the first 18 weeks of treatment with nevirapine. Signs and symptoms of systemic toxicity may be nonspecific, and can include fatigue, malaise, anorexia, nausea, jaundice, liver tenderness, or hepatomegaly, with or without initially abnormal hepatic transaminases.
- **Protease inhibitor therapy and hyperglycemia**: Hyperglycemia, new-onset diabetes mellitus, exacerbation of existing diabetes mellitus, and diabetic ketoacidosis have been reported with receipt of protease inhibitor antiretroviral drugs by HIV infected patients.
- **Postpartum hemorrhage, antiretroviral drugs, and methergine use**: Women experiencing postpartum hemorrhage due to uterine atony are often managed with oral or parenteral methergine or other ergot alkaloids as a first-line agent. However, methergine should not be coadministered with drugs that are potent CYP3A4 enzyme inhibitors, including protease inhibitors and the non-nucleoside reverse transcriptase inhibitors efavirenz and delavirdine. The concomitant use of ergotamines and protease inhibitors has been associated with exaggerated vasoconstrictive responses. When uterine atony results in excessive postpartum bleeding in women receiving protease inhibitors or efavirenz or delavirdine as a component of an antiretroviral regimen, methergine should not be used unless alternative treatments (e.g., prostaglandin F2 alpha, misoprostol, or oxytocin) are not available. If there are no alternative medications available and the need for pharmacologic treatment outweighs the risks, methergine should be used in as low a dosage and for as short a duration as possible.
- **Mitochondrial toxicity and nucleoside reverse transcriptase inhibitor (NRTI) drugs**: Toxicity related to mitochondrial dysfunction has been reported to occur in infected patients receiving long-term treatment with NRTI drugs and generally has resolved with discontinuation of the drug or drugs; a possible genetic susceptibility to these toxicities has been suggested. These toxicities may be of particular concern for pregnant women and infants with *in utero* exposure to NRTI drugs.
- **Neonatal complications**: Data remain insufficient to address the effect that exposure to zidovudine or other antiretroviral agents *in utero* might have on long-term risk for neoplasia or organ-system toxicities in children. Mitochondrial dysfunction should be considered in uninfected children with perinatal antiretroviral exposure who present with severe clinical findings of unknown etiology, particularly neurologic findings. Short-term toxicity of infant zidovudine prophylaxis has been minimal, consisting primarily of transient hematologic toxicity, mainly anemia, which generally resolves by age 12 weeks. Data on the toxicity of multiple antiretroviral drug exposure for the infant are limited.
- **Drug resistance**: Pregnancy presents some special concerns related to the development of drug resistance. Pre-existing resistance to a drug in an antiretroviral prophylaxis regimen may diminish efficacy of that regimen in preventing perinatal transmission. Development of resistance to drugs used during pregnancy for prophylaxis of perinatal transmission may limit future maternal treatment options or decrease the effectiveness of prophylactic regimens in the current pregnancy or future pregnancies. Additionally, if

maternal resistance is present or develops and resistant virus is transmitted, infant treatment options may be limited.

- **Maternal complications of cesarean delivery**: Among women not infected with HIV, maternal morbidity and mortality are greater after cesarean than after vaginal delivery. Complications, especially postpartum infections, are approximately five to seven times more common after cesarean delivery performed after labor or membrane rupture compared with vaginal delivery. Complications after scheduled cesarean delivery are more common than with vaginal delivery but less than with urgent cesarean delivery.

  Data indicate that cesarean delivery is associated with a somewhat greater risk of complications among HIV-infected women than observed among uninfected women, with the difference most notable among women with more advanced disease. Scheduled cesarean delivery for prevention of HIV transmission poses a risk greater than that of vaginal delivery and less than that of urgent or emergent cesarean delivery. Complication rates in most studies were within the range reported in populations of HIV-uninfected women with similar risk factors and were not of sufficient frequency or severity to outweigh the potential benefit of reduced transmission among women at heightened risk of transmission. HIV-infected women should be counseled regarding the increased risks associated with cesarean delivery as well as the potential benefits based on their HIV ribonucleic acid (RNA) levels and current antiretroviral therapy.

- **Safety and toxicity of antiretroviral agents**: Refer to Table 2 titled "Preclinical and Clinical Data Relevant to the Use of Antiretrovirals During Pregnancy" and Table 3 titled "Antiretroviral Drug Use in Pregnant HIV-Infected Women: Pharmacokinetic and Toxicity Data in Human Pregnancy and Recommendations for Use in Pregnancy" in the original guideline document, as well as the companion document titled "Safety and Toxicity of Individual Antiretroviral Agents in Pregnancy," for important and detailed information regarding the safety and toxicity of individual antiretroviral drugs and combination antiretroviral therapy in pregnancy. Both the original guideline document and the companion document are available at the AIDSinfo Web site.

Subgroups Most Likely to be Harmed

Women initiating nevirapine with $CD4^+$ counts >250 cells/mm^3, including pregnant women receiving antiretroviral drugs solely for prevention of transmission, have an increased risk of developing symptomatic, often rash-associated, nevirapine-related hepatotoxicity, which can be severe, life-threatening, and in some cases fatal.

CONTRAINDICATIONS

CONTRAINDICATIONS

Ribavirin is contraindicated during pregnancy.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- These recommendations have been developed for use in the United States. Although perinatal HIV transmission occurs worldwide, alternative strategies may be appropriate in other countries. Policies and practices in other countries regarding the use of antiretroviral drugs for reduction of perinatal HIV transmission may differ from the recommendations in this report and will depend on local considerations, including availability and cost of antiretroviral drugs, access by pregnant women to facilities for safe intravenous infusions during labor, local recommendations regarding breastfeeding by HIV-infected women, and alternative interventions being evaluated in that area.
- Information included in these guidelines may not represent approval by the U.S. Food and Drug Administration (FDA) or approved labeling for the particular product or indications in question. Specifically, the terms "safe" and "effective" may not be synonymous with the FDA-defined legal standards for product approval.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Foreign Language Translations
Patient Resources
Personal Digital Assistant (PDA) Downloads
Resources
Slide Presentation

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness
Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Perinatal HIV Guidelines Working Group. Public Health Service Task Force recommendations for use of antiretroviral drugs in pregnant HIV-1-infected women for maternal health and interventions to reduce perinatal HIV-1 transmission in the United States. Rockville (MD): U.S. Public Health Service; 2008 Jul 8. 98 p. [322 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1998 Jan 30 (revised 2008 Jul 8)

GUIDELINE DEVELOPER(S)

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Public Health Service (U.S.) - Federal Government Agency [U.S.]

SOURCE(S) OF FUNDING

United States Government

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GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Perinatal HIV Guidelines Working Group. Public Health Service Task Force recommendations for use of antiretroviral drugs in pregnant HIV-1-infected women for maternal health and interventions to reduce perinatal HIV-1 transmission in the United States. Rockville (MD): U.S. Public Health Service; 2007 Nov 2. 96 p. [315 references]

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the AIDSinfo Web site.

The guideline is also available for Palm OS or Pocket PC download from the AIDSinfo Web site.

Print copies: Available from the Centers for Disease Control and Prevention, National Prevention Information Network (NPIN), P.O. Box 6003, Rockville, MD 20850. Telephone: (800) 458-5231, TTY (800)-243-7012 International number (301)-562-1098. Web site: http://www.cdcnpin.org.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Safety and toxicity of individual antiretroviral agents in pregnancy. 2007 Nov 2. 21 p. Electronic copies: Available in Portable Document Format (PDF) from the AIDSinfo Web site. Also available for Palm OS or Pocket PC download from the AIDSinfo Web site.
- Wortley PM, Lindegren ML, Fleming PL. Successful implementation of perinatal HIV prevention guidelines. A multistate surveillance evaluation. MMWR Recomm Rep. 2001 May 11;50(RR-6):17-28. Available from the AIDSinfo Web site.

Print copies: Available from the Centers for Disease Control and Prevention, National Prevention Information Network (NPIN), P.O. Box 6003, Rockville, MD 20850. Telephone: (800) 458-5231, TTY (800)-243-7012 International number (301)-562-1098. Web site: http://www.cdcnpin.org.

The following Power Point slide set based on the "Recommendations for use of antiretroviral drugs in pregnant HIV infected women for maternal health and interventions to reduce perinatal HIV transmission in the United States" is also available:

- Perinatal antiretroviral guidelines slide set. AIDS Education and Training Centers (AETC) National Resource Center. 2007 Nov 6. 71 slides. Available from the AETC Web site.
- HIV/AIDS 2005: Mother to Child Transmission. AIDS Education and Training Centers (AETC) National Resource Center. 2005 Dec. 95 slides. Available from the AETC Web site.

The following are also available:

- A pocket guide to adult HIV/AIDS treatment: companion to *A guide to primary care of people with HIV/AIDS*. August 2004 Edition. Fairfax (VA): Health Resources and Services Administration. 2004 Aug. 48 p. Available from the AIDS Education and Training Centers National Resource Center Web site. See the related QualityTool summary on the Health Care Innovations Exchange Web site.
- The AIDSinfo drug database. Available from the AIDSinfo Web site. See the related QualityTool summary on the Health Care Innovations Exchange Web site.
- AIDSinfo's HIV/AIDS Glossary, 4th ed. Available for PDA, in HTML format, and in Portable Document Format (English and Spanish) from the AIDSinfo Web site. See the related QualityTool summary on the Health Care Innovations Exchange Web site.
- A comprehensive Spanish-language Web site featuring information about HIV treatment and clinical trials is available at http://aidsinfo.nih.gov/infoSIDA/.

PATIENT RESOURCES

The following is available:

- HIV during pregnancy, labor and delivery, and after birth. Fact sheets. Rockville (MD): Department of Health and Human Services (DHHS); 2008 Jan. 9 p.

Electronic copies: Available in Portable Document Format (PDF) from the AIDSinfo Web site. See the related QualityTool summary on the Health Care Innovations Exchange Web site.

Print copies: Available from the Centers for Disease Control and Prevention, National Prevention Information Network (NPIN), P.O. Box 6003, Rockville, MD 20850. Telephone: (800) 458-5231, TTY (800)-243-7012 International number (301)-562-1098. Web site: http://www.cdcnpin.org.

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NGC STATUS

This summary was completed by ECRI on March 27, 1999. The original information was verified by the guideline developer on April 29, 1999. This summary was updated by ECRI on February 25, 2000, November 3, 2000, January 24, 2001, May 4, 2001, December 5, 2001, February 4, 2002, August 30, 2002, June 30, 2003, October 14, 2003, December 8, 2003, June 25, 2004, and December 21, 2004. This summary was updated on January 21, 2005, following the release of a public health advisory from the U.S. Food and Drug Administration regarding the use of nevirapine. This summary was updated on March 2, 2005, November 21, 2005, July 11, 2006, October 13, 2006, and on November 8, 2007. This summary was updated by ECRI Institute on August 11, 2008.

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